

PDM sports a new look

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Abstract:

Companies including Engineering Animation (EAI) and Division are integrating product data management (PDM) systems with their 3D visualization technologies to enable engineers to view product structure and product geometry together. For example, EAI plans to integrate its VisFly 3D product visualizer with Adra's Matrix One PDM tool at Meritor Automotive and SDRC's Metaphase PDM system at Ford. EAI's VisNetwork program is used to integrate VisFly and the company's VisMockUp with PDM systems or standard SQL-based relational databases. Division has integrated its dV/Reality virtual prototyping software with Computer Vision's PDM software. Integrating PDM and visualization is not easy because customized programming is required for synchronization of visualization databases, CAD and PDM.

Full Text:

"Most product data management (PDM) systems provide information in a way that is about as visually interesting as watching grass grow," offers Steve Wolfe, editor and publisher of The PDM Report. "There are exceptions," he admits. "Some PDM systems work with software for viewing two-dimensional graphic images, but most of these programs are intended to help workers find and retrieve drawings or models of individual parts or subassemblies." But by teaming PDM with 3D virtual mockups--simplified, or "lightweight," rather than "heavy" 3D models laden with all the associated engineering data--the process of getting to product data may become not only more visually interesting but nearly effortless as well.

Basically, a PDM system is used to track and manage the creation and retrieval of product information such as supplier data, engineering specifications, and bill of materials data. This database of product information, or what is also referred to as the product structure, is usually represented using a hierarchical data tree. "A PDM system typically displays the relationships between parts and assemblies in the form of an indented bill of material or a graphical tree structure, similar in form to Explorer in the Microsoft Windows operating system," explains Wolfe.

Like other information-management technologies, PDM may be viewed as useful but not something users should have to concern themselves with. "Ultimately, product data management should be transparent to the end-user," says IBM marketing manager Steve Shoaf, who is responsible for handling implementation strategies for the company's enterprise-wide PDM solution, IBM Product Manager.

While supplying information to and retrieving it from a PDM system isn't exactly what engineers and designers want to spend their time doing, there is no question as to the value of this information. The intellectual property and intelligence built into the design and manufacture of any product is, by any measure, a company's most important asset. Therefore, being able to effectively access that information is critical. "The key to making that happen," claims Shoaf, "is making product data management software easier to use."

One way to do that to give users something that they can reference intuitively--such as a 3D virtual product mockup--and to let the product data exist behind that. "Making it easier for individuals to reuse rather than re-create data is the goal," says Shoaf. If a 3D graphical interface helps make that happen, then it may be a real boon to product data management.

"The combination of PDM and virtual mockup software is a powerful one because it allows engineers to view the product structure and product geometry together," says Wolfe. Basically, when a user selects a part in the virtual assembly, it directs the PDM software to call up the section of the product tree that includes that subassembly. Conversely, if a part on the product tree is selected, the virtual mockup software brings up the three-dimensional graphics model of the product.

"Until recently, little has been done to help managers or production workers employ the power of three-dimensional graphics to visually interpret the structure of complex products," Wolfe points out. So far, virtual mockup technology has proven its worth in the visualization of complex assemblies for such tasks as checking clearances, virtual training and assembly, and prototype testing. It is now conceivable that the ability to access product data from a virtual mockup will be added to this list. "A year ago, it wasn't realistic to talk about

integrating PDM with virtual mockup software," claims Engineering Animation's chief technology officer, Marty Vanderploeg. "Today, it's not only viable, it's happening."

Visible Benefits

Several companies, users and providers alike, are betting on the future of this integration of PDM and 3D visualization technology.

Engineering Animation Inc. (EAI), for example, recently announced that its VisFly software would be integrated with SDRC's Metaphase PDM system at Ford, and with Adra's Matrix One PDM software at Meritor Automotive (formerly Rockwell Automotive.)

EAI's VisNetwork program manages the visual data for VisFly, EAI's 3D product visualizer, and MsMockUp, EAI's digital prototyping software, and integrates this information with standard SQL,-compliant relational databases or PDM systems. At both Ford and Meritor, the visualization capability afforded by EAI's VisFly product will be integrated tightly with the PDM systems to enable departments throughout the organizations to access, view, and mark up digital product models.

EAI's VisNetwork product can bring up images of each of the subassemblies that reference a part--regardless of the platform or CAD system they may have been created in.

The program is designed to manage product data from a variety of platforms and CAD and PDM systems so that users are able to view and analyze complex products with up to a million parts, interactively.

Meanwhile, Division Inc. recently integrate d its dV/Reality virtual prototyping capability with Computervision's PDM software. While CV's Electronic Product Definition (EPD) product data management strategy clearly endorsed a visual approach to PDM even in its earliest stages, the addition of Division's dVise viewer technology to its Optegra and EPDConnect PDM software promises to offer even more powerful visualization capability. "Essentially, our own proprietary viewing technology would quickly run out of steam when dealing with particularly large databases," says Dan Starr, director of marketing, Computervision-UK

Computervision's EPDConnect software was originally developed to allow a user to see a graphical representation of a product, understand its relationships to the product structure, graphically view all of the processes in which it is involved, and to facilitate sharing this information with other members of a design team. Having a dVise-based viewer embedded into future releases of EPDConnect is intended to give users the ability to interact in real-time with large 3D virtual assemblies consisting of more than tens of thousands of parts.

Division's dV/Reality, dV/MockUP, and dV/Review interactive visualization tools will also be available for use with its viewer technology, making it possible to perform simulation and analysis activities alongside data access and retrieval functions. These tools are intended to allow users to activate "intelligent" components of the models they're seeing through the viewer. For instance, dV/Reality software could allow a user to pull a virtual lever and activate a virtual wing flap on the virtual model.

Division's dV/Reality software might also be used to allow engineers to display properties in the PDM system by color-coding the virtual mockup. For instance, parts still being designed can be made to appear in yellow, while parts released for production can appear in green. It is also possible to colorcode the parts suppliers. "This kind of visual design review might be helpful to managers trying to present an overview of the status of complex projects," explains Wolfe.

Elsewhere, Tecoplan and Object Logic, also players in the virtual mockup technology business, provide links to PDM software. Sherpa's Explorer product, for example, uses Object Logic software as its 3D visual front end.

Integration Issues

Unfortunately, integrating visualization with PDM isn't exactly a simple process. Because virtual mockups are based on a faceted representation of the CAD model--whereas the CAD model usually contains B-spline surface data, solid geometry, and dimension-driven data--virtual mock up software allows workers to visualize especially large product assemblies more quickly. But the value of virtual mockups comes at a price. Each time the CAD model is changed, the virtual mockup must also be updated. And this is not always as straightforward or as

simple as it should be.

"One difficulty of combining PDM with virtual mockup software is that, for the most part it requires customized programming to synchronize the CAD, PDM, and visualization databases," explains Wolfe. "While Division, for example, provides interfaces for transferring geometry into dVise products from Parametric Technology's Pro/Engineer, Unigraphics, and Computervision's CADD5, users must take responsibility for synchronizing the data and verifying that it is correct," he says.

"There's no question that integrating virtual mockup technology with a PDM system is a complex problem," agrees EAI's Vanderploeg. The definition of a structure and what a node inside a PDM represents and how the hierarchy of the whole product structure is defined typically differs from one company to the next. And the formats that each vendor uses are all different as well--SDRC uses a different storage format than one that is used with Pro/E data, for example.

In spite of the challenges, the future of visual PDM looks bright. For one thing, getting CAD, PDM, and visualization software to work together is really a matter of integrating disparate database structures. And that's something that providers of PDM systems, in particular, have had some experience with. In fact, the ability to support different data types, including product files and models from multiple CAD systems, was a primary concern for Computervision when the company originally developed its Optegra PDM system, according to Computervision's Starr. "Optegra and its Optegra/Explorer visual user interface were both built on the basis of providing an open system for sharing and managing product data in a heterogeneous CAD environment," says Starr.

Sherpa Corporation's Sherpa/ Explorer technology also addresses the challenge of managing diverse types of data--from CAD models to legacy PDM system data. Sherpa takes advantage of Object Logic's ability to handle data from different systems using object technology. According to the company, Sherpa/Explorer allows users to readily access and manage product information wherever it is stored or needed in the enterprise--engineering, manufacturing, purchasing, or finance, as well as among vendors and customers--regardless of the source or supplier of the files.

CAD provider Dassault Systemes, makers of Catia software, also acknowledges the importance of being able to support different data type in a PDM system. According to Bernard Charles, president of Dassault Systemes, the STEP standard is an important ingredient in next-generation PDM Systems. "It is our view that the STEP file exchange standard, which is intended to support both geometric as well as feature-,based data, will serve as the cornerstone of PDM," says Charles. Corba, an object-oriented approach to achieving interoperability between different applications and different operating systems, and ActiveX by Microsoft, a technology that facilitates interoperability among Windows-based applications, will also play an important role, according to Charles.

Pain Versus Gain

Other developments are also making it more worthwhile to adopt this type of visual PDM capability. A year ago, models that were accessible only on Unix systems, can now be viewed in at least some form on PCs and even laptops, thanks to advances such as HP's DirectModel toolkit, which facilitates large-model viewing across a variety of computer platforms. As these kinds of enterprise-wide visual PDM systems evolve, a user should be able to quickly and easily access product information independent of the origin of the CAD data, and across a range of operating systems and CAD platforms.

This is not to say that the path to successful implementations of visual PDM will be easy--in fact, quite the opposite. But as Wolfe puts it, "The advantages of having access to a visual representation of the design may well outweigh the pain of putting the system together." While it may entail integration headaches along the way, visual PDM promises to change the way people think about product data--in fact, it may permit them not to think about it at all.

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